

**Case 3362*****Phreatamoeba balamuthi* Chàvez, Balamuth & Gong, 1986 (currently *Mastigamoeba balamuthi*; Protista, Pelobiontida): proposed conservation of the specific name**

Giselle Walker

University Museum of Zoology, Cambridge CB2 3EJ, U.K.

(e-mail: gw265@cam.ac.uk)

**Abstract.** The purpose of this application, under Article 23.9.3 of the Code, is to conserve the specific name *Phreatamoeba balamuthi* Chàvez, Balamuth & Gong, 1986 (currently *Mastigamoeba balamuthi*) for a free-living, polymorphic amoeba. The name *Mastigamoeba balamuthi* is widely used and almost universally accepted, but is threatened by its senior subjective synonym *Mastigamoeba longifilum* Stokes, 1886. No name-bearing types have been fixed for either species in the original publications. Lectotypes based on illustrations are designated here for *Mastigamoeba longifilum* Stokes, 1886, and *Mastigamoeba balamuthi* (Chàvez, Balamuth & Gong, 1986). In order to maintain the stable usage of *M. balamuthi*, it is proposed to conserve the specific name *M. balamuthi* (Chàvez, Balamuth & Gong, 1986) by suppressing *M. longifilum* Stokes, 1886.

**Keywords.** Nomenclature; taxonomy; Protista; Pelobiontida; *Mastigamoeba*; *Phreatamoeba*; *Mastigamoeba balamuthi*; *Mastigamoeba longifilum*; pelobiont; mastigamoebid; flagellated amoeba.

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1. *Mastigamoeba longifilum* Stokes, 1886 (p. 562) was originally described from North America as a flagellated amoeba with hyaline, lobate pseudopodia, individuals being 10–25 microns long. Its circumscription was later extended (Calaway & Lackey, 1962) to being 10–35 microns long. At the time of the description of *Mastigamoeba longifilum* in 1886 the genus *Mastigamoeba* Schulze, 1875 contained amoeboid, flagellated species with hyaline lobate pseudopodia which were different from the long, filose pseudopodia of *Cercomonas* Dujardin, 1841. The description in 1897 of the genus *Mastigella* Frenzel, 1897 to contain species where the nucleus is detached from the flagellum, had the effect of narrowing the circumscription of *Mastigamoeba* to contain species where the nucleus is attached to the base of the flagellum. *Mastigamoeba longifilum* remained placed in the genus on the basis of its description, which clearly shows an organelle (inferred to be the nucleus) at the base of the flagellum.

2. *Mastigamoeba longifilum* Stokes, 1886 was not differentiated from other species of *Mastigamoeba* at the time of its description; however it is the first recognisable described species of *Mastigamoeba* with the characteristics of the genus but no other distinguishing features. It lacks the refringent bodies on the outside of the cell that define the type species, *M. aspera* Schulze, 1875; the bulk of its nucleus is not removed from the base of its flagellum, as is the case in *M. simplex* Kent, 1880. *Mastigamoeba*

*longifilum* was treated as a valid species by Stokes (1886, 1888), Goldschmidt (1907), Lemmermann (1914), Lackey (1923), Calaway & Lackey (1962), Skuja (1964) and Larsen & Patterson (1990).

3. For many free-living protists types have never been fixed because observations are often made on ephemeral samples or because fixation does not preserve diagnostic features. Larsen and Patterson (1990) discussed this problem and advocated the use of specimens represented by uninterpreted images (photographs) as type material, an approach that is consistent with Article 73.1.4 of the Code (Designation of an illustration of a single specimen as a holotype). Using recommendation 73F and Article 74.4 of the Code, a syntype figured by Stokes (1886, fig. 1) is designated here as the lectotype of *Mastigamoeba longifilum* Stokes, 1886. This figure shows the flagellated amoeba, lacking other distinguishing features, which is recognisable as *M. longifilum* Stokes, 1886.

4. Chàvez, Balamuth & Gong, 1986 (p. 398) established the taxon *Phreatamoeba balamuthi* gen. n., sp. n. as the type species of *Phreatamoeba* by monotypy and original designation. *Phreatamoeba balamuthi* Chàvez, Balamuth & Gong, 1986 (currently *Mastigamoeba balamuthi*) was described as polymorphic and pleomorphic, with a dominant multinucleate amoeboid stage, and uninucleate amoeboid flagellated and cyst stages. At the time of its description, it was assigned to a new genus and species, *Phreatamoeba balamuthi* and was incertae sedis on the basis that it was distinct from PARAMOEBIDAE, Pelobiontida (= *Pelomyxa*), Schizopyrenida (all sensu Page, 1976a, b) and the MASTIGAMOEBIDAE (= all pelobionts except *Pelomyxa*; on the grounds that mastigamoebids are 'zooflagellates whose members possess a permanent flagellum'). *Phreatamoeba* was assigned to the pelobionts in 1991 (Myl'nikov, 1991; Brugerolle, 1991a, b; Page & Siemensa, 1991) with new data demonstrating that its ultrastructure was the same as that of *Mastigamoeba* (Brugerolle, 1991a, b). Studies of the morphological variation in pelobionts (Goldschmidt, 1907; Simpson et al., 1997) suggested that pelobionts are generally both polymorphic in their life cycle and pleomorphic as individuals. On these grounds the genus *Phreatamoeba* was judged to be a junior synonym of *Mastigamoeba* (Simpson et al., 1997, p. 95) and the generic assignment of *P. balamuthi* Chàvez, Balamuth & Gong, 1986 was changed accordingly. Another study extended this observation of polymorphism and pleomorphism to three other species of pelobionts (Walker et al., 2001). Assuming our knowledge of biology of pelobionts (Goldschmidt, 1907; Brugerolle, 1991a, b; Simpson et al., 1997; Walker et al., 2001) applies to all pelobionts, *M. balamuthi* (Chàvez, Balamuth & Gong, 1986) is therefore not differentiable from *M. longifilum* Stokes, 1886.

5. Since its description, *M. balamuthi* has almost universally been used as the species name for polymorphic mastigamoebid pelobionts with no other distinguishing features; Larsen & Patterson (1990) is the single exception. Because of the availability of a culture in a type culture collection, this taxon is now the 'representative' pelobiont in studies of molecular phylogenetics, physiology and cell biology, resulting in many papers bearing its name. One reference to *M. balamuthi* (Chàvez, Balamuth & Gong, 1986) (see Baptiste et al., 2002) has been particularly frequently cited, with 145 citations in the last 5 years. An Expressed Sequence Tag (EST) project has been carried out on this taxon, which has 20117 entries in the Genbank sequence database as of May 2007, all of the entries currently bearing the name *M. balamuthi*. The existence of this EST project implies a high probability of

numerous further papers bearing the name *M. balamuthi* being currently underway and being published in the next few years, even if steps are taken to amend the Genbank database in favour of the name *M. longifilum*. Reference to *Phreatamoeba balamuthi* or *Mastigamoeba balamuthi* has been made by 81 authors in the last 21 years. A list of 68 papers not cited in this application, that refer to the name, is held by the Commission Secretariat.

6. As discussed above, the pelobionts are not represented by type material that will satisfy the provisions of the Code. Following recommendation 73F (Avoidance of assumption of holotype) and Article 74.4 of the Code (Designation by means of illustration), the specimen figured by Chàvez et al. (1986, p. 398, fig. 2) is designated here as the lectotype of *Phreatamoeba balamuthi* Chàvez, Balamuth & Gong, 1986. This figure shows the flagellated amoeba, lacking other distinguishing features, which is recognisable as *Mastigamoeba balamuthi*. *M. balamuthi* (Chàvez, Balamuth & Gong, 1986) was originally described from a clonal culture that was subsequently deposited with the American Type Culture Collection as *Amoeba* sp. (<http://www.lgcpromochem-atcc.com/common/catalog/numSearch/numResults.cfm?atccNum=30984>).

7. Recent studies (Chàvez et al., 1986; Griffin, 1988; Brugerolle, 1991a, b; Simpson et al., 1997; Bernard et al., 2000; Walker et al., 2001) have confirmed Goldschmidt's (1907) observation that there is considerable polymorphism and pleomorphism in any single species of pelobionts. This has been confirmed in all species studied recently with this issue in mind. On the basis of these observations and the absence of type material, many species descriptions (based on single sightings of single individuals) now overlap, and in reviewing the situation we conclude that the number of distinguishable entities (species) is considerably smaller than the number of nominal species and genera (Walker & Patterson, in press). The original descriptions and lectotypes of *M. longifilum* and *M. balamuthi* do not show any features which could make them mutually distinguishable. The original description and lectotype of *M. longifilum* cannot be distinguished from the original description or lectotype of *M. balamuthi*. Consequently it is concluded here that *Mastigamoeba longifilum* and *Mastigamoeba balamuthi* are not distinguishable, and that *M. balamuthi* is a subjective junior synonym of *M. longifilum*.

8. *Mastigamoeba longifilum* Stokes, 1886 has priority over *Mastigamoeba balamuthi* (Chàvez, Balamuth & Gong, 1986) if the two are treated as synonyms. Eight publications have included studies of or reference to *Mastigamoeba longifilum* in the last 120 years (see list above in para. 2), compared to 77 that have dealt with the identity of *Mastigamoeba balamuthi* in the last 20 years, of which 53 have been published in the last five years. Current usage of *M. balamuthi*, rather than its senior synonym *M. longifilum* is pervasive, and the strict application of the Principle of Priority would lead to considerable instability.

9. The International Commission on Zoological Nomenclature is accordingly asked:

- (1) to use its plenary power to suppress the name *longifilum* Stokes, 1886, as published in the binomen *Mastigamoeba longifilum*, for the purposes of the Principle of Priority but not for those of the Principle of Homonymy;
- (2) to place on the Official List of Specific Names in Zoology the name *balamuthi* Chàvez, Balamuth & Gong, 1986, as published in the binomen *Phreatamoeba balamuthi*;



- (3) to place on the Official Index of Rejected and Invalid Specific Names in Zoology the name *longifilum* Stokes, 1886, as published in the binomen *Mastigamoeba longifilum* and as suppressed in (1) above.

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Acknowledgement of receipt of this publication was published in BZN **62**: 186.

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